6.3 TURF-RELATED FACILITIES

6.3.1 Introduction

Turf-related facilities are those industrial users that apply water to 10 or more acres of water-intensive landscaped area, including golf courses, parks, schools, cemeteries, and common areas within residential developments. Because "irrigation" is defined in the Code as water applied for the purpose of growing crops for sale or consumption, turf-related watering for recreational and aesthetic purposes is considered a non-irrigation water use.

Turf-related facilities regulated under the industrial conservation program obtain groundwater pursuant to Type 1 or Type 2 grandfathered rights, groundwater withdrawal permits, or recovery permits. In addition, a large number of turf-related facilities are served groundwater by municipal water providers and are also subject to the conservation requirements set forth in this section through provisions of the municipal conservation program (see Chapter 5). These facilities are classified as individual users.

Second Management Plan conservation requirements and other factors have driven changes in turf-related facilities. New facilities are designed with less water-intensive acreage; both existing and new facilities employ technology that applies water more efficiently and facility management has become more cognizant of the need for water conservation.

6.3.2 Water Use by Turf-Related Facilities

Turf-related facilities apply water for growing turfgrass and other landscaping plants and for filling and maintaining water levels in bodies of water. There are 21 turf-related facilities (both industrial users and others) in the Pinal AMA, including golf courses, schools, and a common area. Residential developments having common areas and cemeteries with 10 or more acres of water-intensive landscaping are subject to regulation as turf-related facilities, but none have been identified in the AMA.

In 1995, turf-related facilities encompassed nearly 902 acres of turf and more than 100 surface acres of water in the Pinal AMA. Golf courses are the largest of the turf-related facilities, with most courses having more than 80 acres of water-intensive landscaping. Schools make up the smallest regulated facilities, consisting of 10 to 20 acres of turf. The bodies of water associated with turf-related facilities are most often constructed on golf courses, although the AMA does have a common area with a lake, which encompasses nearly 14 surface acres.

Turf-related facility water use in the Pinal AMA has increased from 2,131 acre-feet in 1987 to 4,285 acre-feet in 1995. While total water use has increased, it continues to be below the total maximum annual water allotment for turf-related facilities of 4,919 acre-feet. Two golf courses in the AMA have chosen to be served entirely with renewable supplies and therefore are not regulated by the Department. These facilities, however, are accounted for in the total water use by turf-related facilities in order to provide a more accurate portrayal of water use.

6.3.3 First and Second Management Plan Program Development

The First Management Plan requirements limited the total water allotment for each facility and stressed water use efficiency. This was the first time golf course water use was regulated, and water management practices, such as evapotranspiration-based water application scheduling, were uncommon. The allotment approach permitted turf managers to consider characteristics of the facility, evaluate conservation alternatives, and decide how to most effectively apply the allotment to meet the facility's needs. The First Management Plan provided for adjustment of turf application rates if effluent was used.

There was a trend in the AMAs throughout the first management period to convert turf-related facilities from groundwater to reclaimed water use. The Department encouraged the use of effluent. Under certain circumstances, turf-related facilities using effluent were given a higher application rate. The exclusion of effluent deliveries from the gallons per capita per day calculation in the municipal conservation program also served as an incentive to providers to serve effluent to turf-related facilities when available.

Development of the Second Management Plan conservation requirements involved extensive data collection regarding water use patterns in central Arizona and the conservation options available to turf-related facility managers. The Department relied heavily on input from the Turf Advisory Committees in the Phoenix and Tucson AMAs, as well as that of a private consultant. The consultant and the advisory committees concluded that a combination of good management and the latest water application systems was shown to be very effective in reducing water use.

For the Second Management Plan, the Department chose not to require specific conservation techniques wherever possible due to the widely varied nature of turf-related facilities. Instead, the approach for the First Management Plan was continued and turf-related facilities were given a maximum annual water allotment based upon the use of conservation techniques. The Second Management Plan included an overall decrease in application rates for all turf-related facilities, limits on water-intensive landscaping for golf courses and cemeteries, plus more specific effluent incentives. Water use figures and other data collected from over 400 turf-related facilities in all of the AMAs were used in determining annual water allotments.

Based on a variety of scientific data, the Department established annual application rates in the Pinal AMA of 4.8 acre-feet per acre per year for turf acres, 6.2 acre-feet per acre for bodies of water, and 1.5 acre-feet per acre for low water use landscaping. The Second Management Plan also exempted effluent-filled lakes from a limitation on golf course water surface acreage. The Department allowed for adjustments in application rates when establishing new turf, using high salinity water, filling or refilling bodies of water, and revegetating acreage disturbed during construction. In addition, the Second Management Plan allowed turf-related facilities a three-year averaging method to compensate for weather fluctuations when determining a facility's compliance with its conservation requirement.

6.3.4 Third Management Plan Issues and Development

The Code provides that the conservation program for industrial users shall require the use of established conservation requirements based on the latest commercially available and economically feasible water conservation technologies. For turf-related facilities, such technologies include: (1) the use of weather-based water application scheduling and water budgeting; (2) accurate, well-designed sprinkler heads and computerized control mechanisms; (3) golf course design that concentrates water-intensive landscaping in those areas that come into play; and (4) PVC lake liners. Using new low water use and drought tolerant turfgrasses, improving conservation knowledge and awareness by facility management, and converting industrial users to renewable supplies are ways turf-related facilities could further contribute to the management goal of the AMA.

Technical Advisory Committees (TACs) in the Phoenix and Tucson AMAs have contributed to the development of the Third Management Plan's conservation program for turf-related facilities. In some cases, subcommittees were formed to address a specific issue and to make a program recommendation to the committee as a whole. These committees and the Department identified the following issues of relevance:

- the allotment methodology and application rates
- weather adjustment
- renewable supply incentives

6.3.4.1 Allotment Methodology and Application Rates

The Second Management Plan turf application rate of 4.8 acre-feet per acre per year applied to all turf-related facilities. For most golf courses constructed after 1985, the maximum annual water allotment was limited to 24.8 acre-feet per hole. During Third Management Plan development, some representatives of the golf industry argued that this limitation denied golf courses their legal right to sufficient groundwater to meet their actual needs consistent with their selected business practices. They felt that the Department's program unreasonably preempted the complete overseeding of golf courses, interfered with reasonable management of longer courses needed to attract high-visibility tournaments, and resulted in target-style courses that imposed unreasonable skill demands on inexperienced and older players. They asserted that the allocations were not supported by sufficient data. Other TAC members felt that the application rates and allotment limitations were supported by scientific research and, that while potentially challenging to superintendents and designers, the allotments were adequate assuming the use of high-quality water application systems and conscientious water management practices.

Factors influencing turf watering needs include temperature, solar radiation, humidity, wind, and soil moisture. Based on research conducted at the University of Arizona Desert Turf Research Center (Brown, Gilbert, and Kopec, 1996) and 1988 to 1996 weather data from the Arizona Meteorological Network, high-quality turf with winter overseeding would need to be irrigated with 4.5 to 5.2 acre-feet per acre per year of water applied depending upon the weather conditions of that year, not including rainfall. This research supports the adequacy of the Second Management Plan's 4.8 acre-feet per acre per year application rate for maintaining overseeded turf.

The parameters assumed in the research are conditions that may lead to a long-term root zone salt accumulation, depending upon the quality of the water applied to turf. Additional investigation is needed to determine if typical rainfall distribution will adequately flush accumulated salts beyond the turfgrasses' root zone or, if rainfall is not sufficient, if continuous water application at a slightly higher rate or periodic flushing at a much higher application rate would best balance salt management and water application efficiency.

Because of regional variation in rainfall, wind speed during watering times, soil type, root zone depth, and course topography can all have potential negative impacts on turf water demand, application rates deemed sufficient for the majority of facilities were agreed upon by the TACs. Individual facilities with special circumstances that could render these application rates unreasonable can seek relief through an administrative review. A.R.S. § 45-575.

The Third Management Plan allotment methodology allows target-type courses to apply water to turf at a higher application rate than the 4.8 acre-feet per acre per year application given for turf acres. Under the Third Management Plan, some or all low water use landscaping will qualify for this application rate if the amount of turf is less than five acres per hole. If low water use landscaping is well-designed and carefully managed to take maximum advantage of rainfall, overspray, and the turf application rate, most of the allocation that is provided for low water use acreage may be applied to turf acres.

Historic water use and research in California indicates that the higher unirrigated perimeter to turfed acre ratios, typical of target-style courses, may result in higher water demand per acre than that of more traditionally designed courses. Increased evapotranspiration may occur with 200 feet of perimeters adjacent to unweathered or low water use areas. On narrow fairways these zones may coincide, and water demand for the entire turfed area may increase on the order of 5 percent. In order to sufficiently quantify this effect for possible inclusion in management plan requirements, additional research needs to be conducted in the desert regions of Arizona.

6.3.4.2 Weather Adjustment

Historically, rainfall in the Pinal AMA tends to be cyclic, with "dry" or "wet" periods that may last as long as four or five years. Evapotranspiration and rainfall measurements since 1992 indicate that the three-year averaging provision of water use to compensate for weather variation in the Second Management Plan may not be adequate. Late and/or sparse summer rainfall in 1993 and 1994 exhausted allotment savings gained in 1992, the last wet year in the AMA. Although evapotranspiration probably doesn't vary more than about 10 percent over the AMA in any one year, rainfall is extremely variable. Long-term weather observations indicate that the average rainfall for similar sites throughout the AMA is about the same, but in a given year, rainfall at different points may vary substantially.

Alternatives considered by the TACs for the Third Management Plan for improving an inadequate weather adjustment in the Second Management Plan included a flexibility account or a five-year averaging provision. The Department opted for a flexibility account for the Third Management Plan that contains both credit and debit limits. The account would encourage and reward careful management through the accrual of credits. Credit and debit limits on the flexibility account were set at 20 percent of the maximum annual water allotment.

6.3.4.3 Renewable Supply Incentives

The Pinal AMA does not have a regional reclaimed water system, which constrains effluent availability for turf-related facilities. While the capacity of wastewater treatment plants in the AMA is increasing, the distribution systems from these plants are limited. Facilities in close proximity to these plants are able to utilize effluent. Effluent use in the AMA, however, will continue to be constrained by the lack of an extensive infrastructure to deliver the water.

The Department and TACs discussed several incentives that would further encourage effluent use for facilities provided by municipalities and industrial users. Because effluent is an underutilized supply, the Department chose to discount all direct effluent use by 30 percent. The incentive will provide a significant discount to encourage effluent use where supplies are expensive and to encourage and reward the construction of wastewater treatment plants to produce effluent in new developments. The incentives acknowledge the need for water use efficiency and conservation by reducing the discount at higher percentages of use, while allowing for higher application rates for facilities using a higher percentage of effluent. The 30 percent effluent discount will allow a typical golf course to apply an amount of water equivalent to the average reference evapotranspiration rate when effluent use is maximized.

The Department and the TACs explored incentives for the use of other non-groundwater supplies. Because efforts by the Arizona Water Banking Authority to fully utilize CAP water are expected to be successful in importing excess CAP supplies into the Pinal AMA, additional incentives are not needed.

6.3.5 Turf-Related Facilities Conservation Program

6.3.5.1 Maximum Annual Water Allotment

The turf conservation program is based on a maximum annual water allotment for each facility. The calculation of allotments is determined by the type of facility. In most cases, there is a direct relationship between the number of acres of turf and artificial lakes and the size of the allotment. For all turf-related facilities, the annual application rate for turf acres is 4.8 acre-feet per acre, the application rate for water surface acres is 6.2 acre-feet per acre, and the application rate for low water use landscaped area is 1.5 acre-feet per acre. The allotment for schools, parks, cemeteries, and common areas is calculated by multiplying acreage by the appropriate application rates shown in Table 6-1. The approach used for these facilities allows expansion of water-intensive landscaped area.

In developing the water allotment formula for golf courses, the Department recognized that the latest conservation technology includes course design that concentrates water-intensive landscaping to areas that come into play, and management practices that adjust water application schedules for weather conditions and seasons of highest play.

Post-1985 golf courses will receive annual water allotments based on the same formula use for other turf-related facilities, up to a maximum of 24 acre-feet per hole for turf and low water use landscaped area. The Third Management Plan allows for an allotment addition for turf and low water use landscape in excess of 24 acre-feet per hole, if effluent will eventually be used on the excess acreage. The allotment for bodies of water on new golf courses that are not entirely filled with direct use effluent or effluent recovered within the area of impact is not to exceed an allotment for more than 0.14 acres per hole. Although the allotment is calculated on a per acre basis, the application of allotment is at the discretion of the facility manager.

Allotments for pre-1986 golf courses are calculated based upon historic acreage of turf, water surface, and low water landscaping. However, any additions to such golf courses are constrained by the same allotment as post-1985 golf courses.

6.3.5.2 Reduction of Turfed Acreage

Conservation requirements for the second management period also provide an incentive to reduce turfed acreage. The annual water allotment for a turf-related facility is based on the maximum area of turf and lakes developed at each facility during the first management period. If historic turfed acreage, low water use landscaped area, or total water surface area is removed, the allotment does not decrease. Schools, parks, cemeteries, and common areas of housing developments are encouraged to minimize the areas landscaped with water-intensive plants.

6.3.5.3 Allotment Adjustment for Revegetation

A revegetation allotment is necessary for facilities that want to establish native or low water use vegetation. This allotment, up to 1.5 acre-feet per acre, is limited to a maximum of three calendar years, after which no additional allotment will be made. The allotment is on an application basis with the quantity and duration to be determined by the Department.

6.3.5.4 Allotment for Filling Bodies of Water

Turf-related facilities may apply to the Department for a one-time allotment adjustment to fill new bodies of water within the facility during the year that the lakes are filled. The allotment will be equal to the volume of the lake. Any facility may apply for an allotment adjustment to refill a body of water that has been emptied for maintenance work to eliminate or reduce seepage losses. This allotment addition may be given only for the year in which the body of water is refilled.

6.3.5.5 Allotment Adjustment for Leaching

When high levels of total dissolved solids are present in the water supply, a turf-related facility may need an additional amount of water for leaching, or deeper percolation, to prevent salts from accumulating in the root zone. If salts are allowed to accumulate in the soil, salinity will eventually reach levels that are toxic to turfgrass. Because most water supplies in the Pinal AMA are of a quality that does not require a leaching allowance, a leaching allowance was not included in the maximum annual water allotment calculation. However, should a facility's water supply have an electrical conductivity of water used (EC_w) value greater than 1.5 millimhos per centimeter (a concentration of approximately 1,000 milligrams per

liter (mg/l) of total dissolved solids), the turf-related facility may apply to the Department for an allotment adjustment for leaching.

6.3.5.6 Additional Conservation Requirements

A conservation plan will be required from all post-1985 turf-related facilities. The plan must outline the practices and technologies the facility will use to maximize its water use efficiency. All turf-related facilities that are not golf courses or cemeteries are required to construct and maintain their facilities so that areas landscaped with water-intensive plants are minimized. Golf courses have a maximum annual water allotment that assumes water-efficient management. Cemeteries may not landscape more than 75 percent of the total cemetery area within any portion of the cemetery not in operation or substantially commenced after December 31, 1985 with plants that are not on the Drought Tolerant/Low Water Use Plant List (see Appendix 5I), or any modifications to the list. This restriction does not apply to an expansion of a cemetery onto contiguous land that was under the same ownership as the cemetery as of December 31, 1985.

6.3.5.7 Effluent Use Adjustment

To encourage the maximum use of effluent on turf-related facilities during the third management period, the Department has modified the effluent incentive offered in the Second Management Plan. While a facility's annual allotment does not change, each acre-foot of effluent will be counted as 0.7 acre-foot when compliance with the maximum annual water allotment is determined. This adjustment does not apply to effluent stored in a storage facility pursuant to a water storage permit and recovered outside of the area of impact of the stored water.

6.3.5.8 Flexibility Account

In order to compensate for varying weather conditions year to year, turf-related facilities will have a flexibility account with credit and debit limits. In wetter years or through careful management, facilities will be able to accrue a credit balance up to 20 percent of a facility's allotment. When weather conditions or water management decisions cause a facility's water use to exceed its allotment in any year, accrued credits are expended. If all credits are exhausted, a facility may accrue a debit balance up to 20 percent of its allotment. Only when a facility exceeds its allotment and cannot accrue anymore debits will an allotment violation occur.

6.3.5.9 Monitoring and Reporting Requirements

The Third Management Plan includes additional monitoring and reporting requirements for turf-related facilities. All turf-related facility water use will be assumed to be for landscape watering purposes unless non-landscape water is metered separately.

6.3.6 Non-Regulatory Efforts

In 1991, the Department initiated a grants program for conservation assistance and augmentation of water supplies in the AMAs. Individual AMA programs focus on the areas of highest water conservation potential in each water use sector (agricultural, municipal, and industrial) based on total water usage, current water usage practices, and potential for implementation of new conservation technologies. Funding for the program comes from an annual withdrawal fee collected from all regulated groundwater users in the AMA.

Since 1991, over $70,000 has been awarded in the AMAs under the grants program to assist turf-related facilities through evaluation and implementation of conservation strategies. Funded projects include water

application scheduling workshops for facility managers, a public school water application system audit and repair program, electronic over watering controller field testing, and a water application field study that compared turf water demand under high and low traffic conditions.

During the third management period, the Department will continue to assist turf-related facilities in meeting their conservation requirements through direct staff assistance and through the grants program. See Chapter 9 for a description of the Water Management Assistance Program for the Third Management Plan.

6.3.7 Future Directions

Management plan conservation requirements can reduce groundwater use only to the extent that the requirements are consistent with reasonable economic return. Increased utilization of renewable water supplies combined with efforts to maximize water application efficiency become key factors in meeting the AMA's water management goal.

A change to the statutes that would allow the CAGRD to replenish mined groundwater not associated with the demonstration of an assured water supply would expand the roles of the replenishment district and the Department in replenishment and recharge activities. Such legislation would establish a foundation for a replenishment obligation for all or a portion of mined groundwater used by turf-related facilities, facilitating greater utilization of renewable supplies and reducing groundwater overdraft.

A stronger conservation component through conservation technology and water management practice requirements should be considered from both the regulatory and non-regulatory approaches. From a regulatory perspective, application rates that determine the maximum annual water allotments need to be further scrutinized under actual field conditions. Conservation technologies and practices should be further evaluated as regulatory alternative to enforceable allotments. From a non-regulatory approach, development of incentive programs should also be continued during subsequent management periods. If necessary, efforts to broaden participation in water storage and recovery options could be continued as well.

6.3.8 Industrial Conservation Requirements and Monitoring and Reporting Requirements for Turf-Related Facilities

6-301. Definitions

In addition to the definitions set forth in Chapters 1 and 2 of Title 45, Arizona Revised Statutes, and section 6-201 of this chapter, the following words and phrases used in sections 6-301 through 6-305 of this chapter, unless the context otherwise requires, shall have the following meanings:

1. *"Body of water" means a constructed body of water or interconnected bodies of water, including a lake, pond, lagoon, or swimming pool, that has a surface area greater than 12,320 square feet when full and that is filled or refilled primarily for landscape, scenic, recreational purposes, or regulatory storage.*

2. *"Common area" means an area or areas which is owned and operated as a single integrated facility and which is used for recreational or open space purposes. A common area is maintained for the benefit of the residents of a housing development.*

3. *"Contiguous" means in contact at any point or part of the same master-planned community. Two parcels of land are contiguous even if they are separated by one or more of the following: a road, easement, or right-of-way.*

4. *"Direct use effluent" means effluent transported directly from a facility regulated pursuant to Title 49, Chapter 2, Arizona Revised Statutes, to an end user. Direct use effluent does not include effluent that has been stored pursuant to Title 45, Chapter 3.1, Arizona Revised Statutes.*

5. *"Effluent recovered within the area of impact" means effluent that has been stored pursuant to Title 45, Chapter 3.1, Arizona Revised Statutes, and recovered within the stored effluent's area of impact. For purposes of this definition, "area of impact" has the same meaning as prescribed by A.R.S. § 45-802.01.*

6. *"Golf course" means a turf-related facility used for playing golf with a minimum of nine holes and including any practice areas.*

7. *"Hole" means a component of a golf course consisting at a minimum of a tee and a green. A practice area or driving range is not a hole.*

8. *"Landscape watering" means the application of water from any source, including effluent, to a water-intensive landscaped area, a low water use landscaped area, or revegetation acres within a turf-related facility.*

9. *"Low water use landscaped area" means an area of land of at least one acre in aggregate, which is an integral part of a turf-related facility, which is watered by a permanent water application system and which is planted primarily with plants listed in Appendix 5I, Drought Tolerant/Low Water Use Plant List, or any modifications to the list. Mature vegetation planted in a low water use landscaped area must cover at least 50 percent of the area.*

10. *"Newly turfed area" means, for a calendar year, an area of land planted with a warm-season grass species which was not planted with a warm-season grass species during the preceding calendar year.*

11. *"Overseeded area" means, for a calendar year, an area of land planted with any cool-season grass species that grows over a dormant warm-season grass species during the fall-winter period.*

12. *"Post-1985 turf-related facility" means a turf-related facility that was neither in operation as of December 31, 1985 nor substantially commenced as of December 31, 1985.*

13. *"Pre-1986 turf-related facility" means a turf-related facility that was either in operation as of December 31, 1985 or substantially commenced as of December 31, 1985, and includes any expanded of modified portion of such a facility.*

14. *"Regulation golf course" means a golf course of at least 18 holes that is 6,200 yards or more in length per 18 holes as measured from back of the tee ground furthest from the green down the center line of the hole to the center of the green.*

15. *"Substantially commenced" means that all pre-construction permits and approvals required by federal, state, or local governments have been obtained or substantial capital investment has been made in the physical on-site construction.*

16. *"Total cemetery area" means an area of land being used for cemetery-related purposes, including any area of land covered by grave markers or by cemetery-related buildings, walks, pathways, and landscaping, but not including roads, parking lots, and any areas of land being held for future expansion of the cemetery.*

17. *"Turf acres" means an area of land that is watered with permanent water application system and planted primarily with plants not listed in Appendix 5I, Drought Tolerant/Low Water Use Plant List, or any modifications to the list.*

18. *"Turf-related facility" means any facility, including cemeteries, golf courses, parks, schools, or common areas within housing developments, with a water-intensive landscaped area of 10 or more acres. Turf-related facilities include, but are not limited to, those facilities listed in Appendix 6A.*

19. *"Water-intensive landscaped area" means, for a calendar year, the turf acres and the water surface acres within a turf-related facility.*

20. *"Water surface acres" means the total surface area of all bodies of water that are an integral part of the water-intensive landscaped area of a turf-related facility. Bodies of water used primarily for swimming purposes are not an integral part of the water-intensive landscaped area of a turf-related facility.*

6-302. Conservation Requirements for Turf-Related Facilities

A. Maximum Annual Water Allotment

Beginning with calendar year 2002 or the calendar year in which landscape watering commences, whichever is later, and for each calendar year thereafter until the effective date

of any substitute conservation requirement in the Fourth Management Plan, an industrial user who uses water at a turf-related facility shall not withdraw, divert, or receive water for landscape watering purposes at the turf-related facility during a year in an amount which exceeds the turf-related facility's maximum annual water allotment for the year as calculated in section 6-303.

B. Conservation Plan for Post-1985 Turf-Related Facilities

No later than January 1, 2002 or 180 days after receiving official notice of these conservation requirements, whichever occurs later, an industrial user who uses water at a post-1985 turf-related facility shall have prepared an accurate and detailed description of the conservation technologies, including management practices, that a facility uses in the delivery of water for landscape watering purposes. The industrial user shall maintain the plan until the first compliance date for any substitute requirement in the Fourth Management Plan.

C. Limiting Water-Intensive Landscaped Area

1. *Beginning on January 1, 2002 or upon commencement of landscape watering, whichever occurs later, and continuing until the effective date of any substitute requirement in the Fourth Management Plan, an industrial user who uses water at a turf-related facility that is not a cemetery or a golf course shall design, construct, and maintain the grounds of the facility in a manner that minimizes the water-intensive landscaped area of the facility consistent with the use of the facility. All of the facility's water-intensive landscaping shall be planted in those areas directly associated with the turf-related facility's primary purposes.*

2. *Beginning on January 1, 2002 or upon commencement of landscape watering, whichever is later, and continuing until the effective date of any substitute conservation requirement in the Fourth Management Plan, an industrial user who uses water at a turf-related facility that is a cemetery shall limit the water-intensive landscaped area within any portion of the facility that was neither in operation as of December 31, 1985 nor substantially commenced as of December 31, 1985 so that no more than 75 percent of the total cemetery area within that portion of the cemetery is planted with plants not listed in Appendix 5I, Drought Tolerant/Low Water Use Plant List, or any modifications to the list. This requirement shall not apply to any expanded portion of a cemetery in operation as of December 31, 1985 or substantially commenced as of December 31, 1985 if the expanded portion of the cemetery was under the same ownership as the cemetery as of December 31, 1985.*

6-303. Calculation of Maximum Annual Water Allotment for Turf-Related Facilities

A. Turf-Related Facilities that are Not Golf Courses

For each calendar year, the maximum annual water allotment for a turf-related facility that is not a golf course shall be calculated by determining the number of acres in existence within the facility during the calendar year in each of the categories listed in Table 6-1 and then multiplying the number of acres in each category by the applicable application rate for each category as set forth in Table 6-1. The sum of the products, plus any allotment additions allowed pursuant to subsection D of this section, is the facility's maximum annual water allotment for the calendar year.

B. Pre-1986 Turf-Related Facilities that are Golf Courses

For each calendar year, the maximum annual water allotment for a pre-1986 turf-related facility that is a golf course shall be calculated by determining the number of acres in existence within the facility during the calendar year in each of the categories listed in Table 6-1 and then multiplying the number of acres in each category by the applicable application rate for each category as set forth in Table 6-1. The sum of the products, plus any allotment adjustments allowed pursuant to subsection D of this section, is the facility's maximum annual water allotment for the year, subject to the following limitations:

1. *In determining the number of water surface acres in existence within the facility during the calendar year, the total surface area of any bodies of water added to the facility after December 31, 1985 and not filled and refilled exclusively with direct use effluent or effluent recovered within the area of impact shall be limited to an area calculated by multiplying the number of holes added to the facility after December 31, 1985 by 0.14 acre per hole. For purposes of this paragraph, a body of water filled and refilled pursuant to an interim water use permit issued under A.R.S. § 45-133 shall be deemed to be filled and refilled exclusively with direct use effluent or effluent recovered within the area of impact if the body of water will be filled and refilled exclusively with one of those types of effluent after the permit expires.*

2. *The total allotment for any turf acres and low water use landscaped area added to the facility after December 31, 1985 shall not exceed an amount calculated by multiplying the number of holes added to the facility after December 31, 1985 by 24.0 acre-feet of water per hole, plus any allotment additions allowed under subsection D of this section.*

C. Post-1985 Turf-Related Facilities that are Golf Courses

The maximum annual water allotment for a post-1985 turf-related facility that is a golf course shall be calculated by determining the number of acres in existence within the facility during the calendar year in each of the categories listed in Table 6-1 and then multiplying the number of acres in each category by the applicable application rate for each category as set forth in Table 6-1. The sum of the products, plus any adjustments allowed pursuant to subsection D of this section, is the facility's maximum annual water allotment for the calendar year, subject to the following limitations:

1. *In determining the number of water surface acres in existence within the facility during the year, the total surface area of all bodies of water not filled and refilled exclusively with direct use effluent or effluent recovered within the area of impact shall be limited to an area calculated by multiplying the number of holes present within the facility during the year by 0.14 acre per hole. For purposes of this paragraph, a body of water filled and refilled pursuant to an interim water use permit issued under A.R.S. § 45-133 shall be deemed to filled and refilled exclusively with direct use effluent or effluent recovered within the area of impact if the body of water will be filled and refilled with such water after the permit expires.*

2. *The total allotment for turf acres and low water use landscaped area within the facility during the year shall not exceed an amount calculated by multiplying the number of holes present within the facility during the year by 24.0 acre-feet of water per hole, plus any allotment additions allowed under subsection D of this section.*

TABLE 6-1
APPLICATION RATES FOR TURF-RELATED FACILITIES
PINAL ACTIVE MANAGEMENT AREA

From 2002 until the first compliance date for any substitute requirement in the Fourth Management Plan

(Acre-feet per acre per calendar year)

Application Rate - Turf Acres Including Newly Turfed Area

	2002 - Fourth Management Plan
All Facilities	*4.8*

Application Rate - Total Water Surface Area

	2002 - Fourth Management Plan
All Facilities	*6.2*

Application Rate - Low Water Use Landscaped Area

	2002 - Fourth Management Plan
All Facilities	*1.5*

D. Allotment Additions

1. Newly Turfed Area Establishment Addition

For any year in which a warm-season turfgrass species is initially planted at a turf-related facility, the facility shall receive an allotment addition of 1.0 acre-foot of water per acre of newly turfed area. For golf courses, the newly turfed area establishment addition shall not exceed an amount calculated by multiplying the number of holes present within the newly turfed area by 5 acre-feet of water.

2. Revegetation Addition

The owner or operator of a turf-related facility may apply to the director for an allotment addition to revegetate areas within and around the facility after initial construction or renovation of new acres. The director may allow up to an additional 1.5 acre-feet of water per revegetation acre for up to three years if the following conditions apply to the acres for which the revegetation addition is sought:

a. The plants which are planted within the revegetation acres are listed in Appendix 5I, Drought Tolerant/Low Water Use Plant List, or any modifications to the list, or were adapted to the site conditions prior to construction;

b. The aggregate area to be watered exceeds one acre and has at least 50 percent vegetative coverage at maturity;

c. *An allotment is not provided for the revegetation area under subsection A, B, or C of this section; and*

d. *All of the water applied to the revegetation acres is measured and reported as part of the total water use of the facility.*

3. *Body of Water Fill and Refill Addition*

a. *A turf-related facility shall receive a one-time body of water fill allotment addition equal to the volume of water used for the initial filling of any new bodies of water added after January 1, 2002 within the facility. The facility shall receive the allotment addition only for the calendar year in which the body of water is filled.*

b. *If a body of water at a turf-related facility is drained or partially drained to allow for repairs to reduce water losses, the owner or operator of the facility may apply to the director for an addition to the facility's allotment in the amount of water necessary to refill the body of water. The director shall grant the allotment addition if the director determines that draining the body of water was necessary to allow for repairs to reduce water losses. The facility shall receive the allotment addition only for the calendar year in which the body of water is refilled.*

4. *Removed Acreage Addition*

A turf-related facility that removes acres of water-intensive landscaped area in existence within the facility prior to January 1, 1990 shall receive an allotment addition equal to the allotment the acres would have received pursuant to the Third Management Plan if they had not been removed, provided that the acres were given a water allotment in the First Management Plan, the Second Management Plan, or the Third Management Plan.

5. *Leaching Allotment Addition*

The owner or operator of a turf-related facility may apply to the director for an allotment addition for leaching purposes. The director shall approve the application if the water supply used for landscape watering at the facility contains at least 1,000 mg/l of total dissolved solids. If the director approves an allotment addition for leaching purposes, the director shall calculate the additional allotment as follows:

$$\textbf{Leaching Allotment Addition} = \left(\frac{1}{1 - \left(\frac{EC_w}{5EC_e - EC_w} \right)} - 1 \right) \times \frac{CU}{0.85}$$

Where: EC_w = *Electrical conductivity of water used*

EC_e = *Tolerance of the grass species grown to the soil salinity in electrical conductivity of the soil saturation extract*

CU = *Consumptive use requirement for the grass species grown*

Any allotment addition granted under this paragraph shall remain in effect until the water supply used for landscape watering at the facility contains less than 1,000 mg/l of total dissolved solids or until the effective date for the facility's conservation requirements in the Fourth Management Plan, whichever occurs first.

6. *Allotment Addition for Additional Low Water Use Landscaped Area and Turfed Acres Within Post-1985 Turf-Related Facilities that are Regulation Golf Courses*

   a. *The owner or operator of a post-1985 turf-related facility that is a regulation golf course shall receive an allotment addition for additional low water use landscaped area and turf acres if the total low water use landscaped area and turf acres within the facility exceeds an area calculated by multiplying the number of holes within the facility by five acres. The amount of the allotment addition shall be calculated pursuant to subparagraph b of this paragraph and shall be subject to the conditions set forth in subparagraphs c and d of this paragraph.*

   b. *The allotment addition allowed under subparagraph a of this paragraph shall be calculated as follows:*

      1) *Determine the facility's "base allotment acres." The facility's base allotment acres are the total turf acres and low water use landscaped area within the facility, up to a maximum of five acres per hole. In determining the base allotment acres, turf acres shall be counted first.*

      2) *Determine the turf acres and low water use landscaped area within the facility that are not included within the base allotment acres.*

      3) *Multiply the turf acres determined in item 2) above by an application rate of 3.0 acre-feet per acre. Multiply the low water use landscaped area determined in item 2) above by an application rate of 1.5 acre-feet per acre.*

      4) *Add the products in item 3) above. The allotment addition allowed by subparagraph a of this paragraph is the sum of the products in item 3) or an amount calculated by multiplying the number of holes within the facility by five acre-feet, whichever is less.*

   c. *Any allotment addition allowed under subparagraph a of this paragraph shall apply during the seventh through tenth calendar years after the turf-related facility commences landscape watering only if one of the following applies:*

      1) *Direct use effluent or effluent recovered within the area of impact is used within the facility for landscape watering purposes during the year in an amount equal to or greater than the amount of the allotment addition.*

      2) *The owner or operator of the facility extinguishes long-term storage credits earned for the storage of effluent or Central Arizona Project water within the Pinal Active Management Area pursuant to a storage permit issued under title 45, chapter 3.1, Arizona Revised Statutes, in the following amount: a) during the seventh and eighth calendar years after the facility commences landscape watering, the difference between the allotment addition and the amount of direct use effluent or effluent recovered within the area of impact used within the facility for landscape watering purposes during the year; and b) during the ninth and*

tenth calendar years after the facility commences landscape watering, an amount calculated by multiplying 1.5 by the difference between the allotment addition and the amount of direct use effluent or effluent recovered within the area of impact used within the facility for landscape watering purposes during the year. Proof of extinguishment shall be included in the facility's annual water use report required by A.R.S. § 45-632.

d. Any allotment addition allowed under subparagraph a of this paragraph shall apply in any year subsequent to the tenth calendar year after the turf-related facility commences landscape watering only if direct use effluent or effluent recovered within the area of impact is used within the facility for landscape watering purposes during the year in an amount equal to or greater than the amount of the allotment addition.

E. Combined Allotments for Contiguous Facilities

The maximum annual water allotments for contiguous turf-related facilities under one ownership or operation may be combined. All or a portion of the combined maximum water allotment may be applied to any part of the contiguous facilities.

F. *Nothing in this section shall be construed as authorizing the use of more groundwater or surface water than may be used pursuant to any groundwater or appropriable water rights or permits associated with the use. Nor shall this section be construed as authorizing the use of groundwater or surface water in any manner that violates Chapter 1 or Chapter 2 of Title 45, Arizona Revised Statutes.*

6-304. Compliance with Maximum Annual Water Allotment

A. Effluent Use Adjustment

For purposes of determining compliance with the maximum annual water allotment requirement, the director shall count each acre-foot of direct use effluent or effluent recovered within the area of impact that was used at the turf-related facility for landscape watering purposes during the calendar year as 0.7 acre-foot of water.

B. Flexibility Account

The director shall determine if a turf-related facility is in compliance with the maximum annual water allotment requirement through the maintenance of a flexibility account for the facility according to the following:

1. Beginning with calendar year 2002 or the first full calendar year after the commencement of landscape watering, whichever is later, a flexibility account shall be established for a turf-related facility with a beginning balance of zero acre-feet.

2. Following each calendar year in which groundwater is withdrawn, diverted, or received for landscape watering purposes at the facility, the director shall adjust the turf-related facility's flexibility account as follows:

a. Subtract the total volume of water from any source, including effluent as adjusted under subsection A of this section, used by the facility for landscape watering purposes during that reporting year, from the facility's maximum annual water allotment for that year.

b. If the result in subparagraph a of this paragraph is positive, credit the flexibility account by this volume.

c. If the result in subparagraph a of this paragraph is negative, debit the flexibility account by this volume.

3. The account balance existing in a turf-related facility's flexibility account after the adjustment provided for in paragraph 2 of this subsection is made shall carry forward subject to the following limitations:

a. The maximum positive account balance allowed in the flexibility account of a turf-related facility after any credits are registered pursuant to paragraph 2, subparagraph b of this subsection shall be calculated by multiplying the facility's maximum annual water allotment for the calendar year for which the credits are registered by 0.2. If the account balance exceeds the maximum positive account balance after the credits are registered, the balance carried forward shall be equal to the maximum positive account balance for the calendar year.

b. The maximum negative account balance allowed in the flexibility account of a turf-related facility after any debits are registered pursuant to paragraph 2, subparagraph c of this subsection shall be calculated by multiplying the facility's maximum annual water allotment for the calendar year for which the debits are registered by -0.2. If the account balance is less than the maximum negative account balance after the debits are registered, the balance carried forward shall be equal to the maximum negative account balance for the calendar year.

C. Compliance Status

If the adjustment to a turf-related facility's flexibility account following a calendar year as provided for in subsection B, paragraph 2 of this section, causes the account to have a negative account balance less than the maximum negative account balance allowed in the flexibility account for the calendar year as calculated in subsection B, paragraph 3, subparagraph b of this section, the industrial user who uses water at the facility is in violation of the facility's maximum annual water allotment for that calendar year in an amount equal to the difference between the facility's flexibility account balance and the maximum negative balance allowed in the facility's flexibility account for that year.

6-305. Monitoring and Reporting Requirements

A. *An industrial user who uses water at a turf-related facility that commences landscape watering within any new acres after January 1, 2002 shall submit to the director documentation of the new acreage within the facility no later than 90 days after commencing landscape watering to the new acres or receiving notice of these conservation requirements, whichever is later. The scale of the submitted documents, extent of turf acres, water surface acres, and low water use landscaped area must clearly be shown. Documentation may consist of one or more of the following:*

1. As-built plans certified by a registered professional such a civil engineer, golf course designer, or landscape architect.

2. Aerial photography at a scale no smaller than 1" = 200'.

3. *A survey of the facility certified by a registered professional such a civil engineer or land surveyor.*

4. *Any other documentation upon approval by the director.*

B. *For calendar year 2002 or the calendar year in which landscape watering commences, whichever occurs later, and for each calendar year thereafter until the first compliance date for any substitute monitoring and reporting requirement in the Fourth Management Plan, an industrial user who uses water at a turf-related facility shall include in the annual report required by A.R.S. § 45-632 the following information:*

1. *The total quantity of water by source, disaggregated by source, withdrawn, diverted, or received during the calendar year for landscape watering purposes at the facility, as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*

2. *The total amount of effluent, disaggregated by direct use effluent, effluent recovered within the area of impact, and effluent recovered outside the area of impact that was withdrawn or received during the calendar year for landscape watering purposes at the facility, as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*

3. *The number of acres of turf acres within the facility during the calendar year, not including newly turfed area.*

4. *The number of acres of total water surface area within the facility during the calendar year.*

5. *The number of acres of low water use landscaped area within the facility during the calendar year.*

6. *The number of acres of newly turfed area within the facility during the calendar year.*

7. *The number of turf acres removed within the facility during the calendar year.*

8. *The number of acres of total water surface area added or removed within the facility during the calendar year.*

9. *The number of acres of low water use landscaped area added or removed within the facility during the calendar year.*

10. *If the facility is a golf course, the length of the course as measured from the back of each tee ground furthest from the associated green, then down the center line of the hole to the center of the green.*

11. *The number of acres approved by the director for a revegetation addition pursuant to section 6-303, subsection D, paragraph 2, within the facility during the calendar year.*

12. *The quantity of water used to fill or refill a body of water within the facility during the calendar year, for which an allotment addition is sought pursuant to section 6-303, subsection D, paragraph 3.*

13. *The number of acres of overseeded area within the facility during the calendar year.*

14. *If the facility is a golf course, the number of holes within the facility during the calendar year.*

15. *If the facility is a golf course, the number of holes added during the calendar year.*

16. *If the facility is a golf course that qualifies as a pre-1986 turf-related facility, the number of acres of turf acres, low water use landscape area and water surface acres added to the facility after December 31, 1985, and the number of holes added to the facility after December 31, 1985.*

17. *An estimate of the quantity of water from any source, including effluent, used for each purpose other than landscape watering purposes at the facility during the reporting year. Any water used at the facility that is not measured separately from the water used for landscape watering shall be counted by the director as water used by the facility for landscape watering for purposes of calculating the compliance with the maximum annual water allotment.*

C. *A single annual report may be filed for contiguous turf-related facilities if the maximum annual water allotments of the facilities are combined pursuant to section 6-303, subsection E. The annual report shall report water use and landscaped areas of the contiguous facilities as required in subsection B of this section.*